Historical Note: Atherton Seidell and the Photoduplication of Library Material

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Atherton Seidell was a pioneer in the use of photoduplication as a means of scientific communication. Through a series of seminal articles in *Science* in the 1930s and 1940s, Seidell established a theoretical justification for the use of microfilms as a means of facilitating scientific information exchange. Seidell himself was an accomplished chemist, and he based his arguments on his perceptions as a scientist of the information needs of the scientific community. Through his involvement with microfilming in lieu of interlibrary loan at the three national libraries, Seidell attempted to put his ideas into practice. In particular he championed free photoduplication of library materials as both a natural extension of library services to patrons at a distance and as a tremendous boon to science. His attempts to promote microfilms in library were for the most part unsuccessful, however, because librarians approached information needs from a different perspective.

Atherton Seidell was for over a quarter of a century one of the leaders in international documentation. Thanks to his efforts, photoduplication in lieu of interlibrary loan was introduced into the three national libraries, the National Agricultural Library, the National Library of Medicine, and the Library of Congress. Further, through a series of articles in *Science* in the 1930s and 1940s, he laid some of the first theoretical bases for the use of microfilm. The need to make the contents of recent journals widely known led him to start the *Current List of Medical Literature*. Along the way he contributed to the development of new microfilm cameras and readers and helped found the American Documentation Institute (which became the American Society for Information Science). His contributions to the development of microfilm were recognized by the National Micrographics Association (now the Association of Information and Image Management) in 1961 when he was awarded a Pioneer Medal (Tate, 1961).

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Yet today Seidell's contributions to microfilming and information science are largely forgotten. None of his writings appear in Veaner's documentary history of microfilming (Veaner, 1976), nor have any of his *Science* articles been cited during the past 20 years in *Science Citation Index* or *Social Science Citation Index*. During those years only three citations to his general works on library and information science appear.

In spite of a long and active career in the service of documentation, Seidell's theories about microfilming were first dismissed, then ignored by the library and information science community. To understand how Seidell derived his justifications for the use of microfilm, and to understand why those justifications have been broadly ignored, it is necessary to examine the origins of those ideas. At its root Seidell's approach to microfilming was that of the scholar rather than the librarian, in spite of his long association with libraries. The justifications he derived for the use of microfilm were based on the interests and needs of the research community, not those of the library profession. The failure of librarians and information scientists to accept, or even actively debate, Seidell's arguments becomes, therefore, a by-product of their failure to understand and address the needs of the communities that they ostensibly serve.

Biography

Atherton Seidell was born in Hartwell, Georgia on December 31, 1878. He received his undergraduate degree in 1899 from the University of Georgia, followed by a Masters degree in Chemistry in 1901 from George Washington University, and his studies culminated with a Ph.D. degree in chemistry from Johns Hopkins University in 1903. While still in graduate school, Seidell began to work for the U.S. Department of Agriculture, beginning a long career of government service. As a biochemist, first in the Agriculture Department and later in the Hygienic Laboratory of the Public Health Service (later to become the National Institutes of Health), Seidell worked on a variety of research problems. His early research interests were in the solubility of organic chemicals. Later his interests shifted to the isolation of Vitamin B, and he performed many studies on

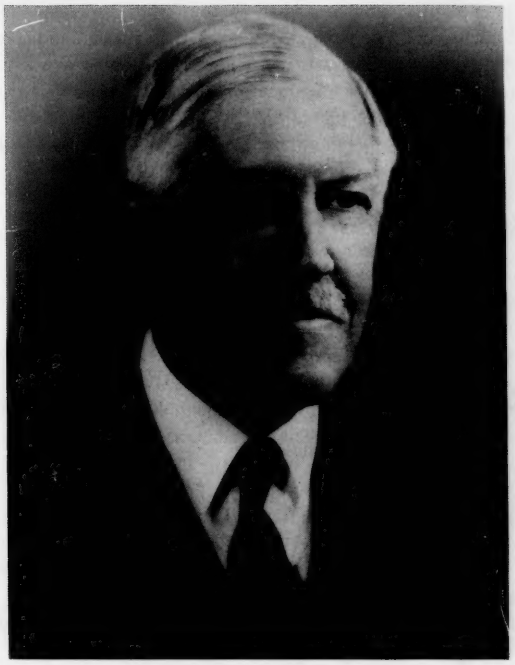

FIG. 1. Atherton Seidell, 1878–1961.

vitamins in conjunction with French colleagues at L'Institut Pasteur where he often did much of his research.

Seidell is probably most well known, however, for a work which he began before he was thirty. Seidell's *Solubilities of Inorganic and Organic Compounds*, first published in 1907, was destined to become a standard reference tool in the field. Through his personal efforts, and later under his supervision, tremendous numbers of scientific papers from all over the world were searched so that their information could be summarized in the reference work. The value of the endeavor, and also the enormity of the task involved in sorting out the data, was recognized by the American Chemical Society in 1939 when they assumed responsibility for its publication. Under their auspices, a fourth edition of the work appeared in 1958–1965 (Seidell, 1961; Medinger, 1964, 1976; Sewell, 1962).

Early Experiences with Documentation

It was Seidell's active career as a biochemist and author that brought the problem of the dissemination of scientific information to his attention. During the first third of the twentieth century, when Seidell was most active in his research, the mechanisms facilitating the exchange of scientific information were primitive by modern standards. Perhaps the most effective means of communicating scientific discoveries was through the informal exchange of correspondence and reprints. The great index and abstracting services, such as *Biological Abstracts* or *Chemical Abstracts*, were in their infancy or had yet to be founded; even abstract journals, as Derek de Solla Price has noted in his classic study of the growth of scientific publishing, were relatively few in number, though their number shortly thereafter began to increase rapidly (Price, 1975). A few fortunate scientists could avail themselves of reference tools such as the *Index-Catalogue of the Surgeon General's Library* or *Index Medicus*, but for many others, and especially for those either moving into new areas of research or working in isolation, the likelihood that they would become aware of relevant publications was purely a matter of chance.

Early in his career Seidell himself was the victim of the poor methods of information exchange then available. As he recounted in 1957, "Many years ago, as a struggling young chemist, I was given the problem of determining the solubility of calcium sulfate in aqueous solutions of sodium chloride. After completing the experiments I found that results for the system had previously been published and my several weeks' work had been wasted" (Seidell, 1957). The experience led Seidell to begin in 1907 to work on what would become the first edition of his compilation of solubility data. Research for his book required long hours of copying by hand in the U.S. Department of Agriculture Library (now the National Agriculture Library). These two experiences—having to spend long hours copying articles by hand, and having to duplicate previously published research—led Seidell to begin to think seriously about the problems of scientific information, and the best means for its collection and dissemination.

Seidell and Microfilms

Microfilm as a medium for the exchange of information was an idea in the air in the mid-1920s. In Washington, Watson Davis and Edward Slosson of the Science Service had turned their attention to the problems of documentation and became vocal advocates for microfilm (Davis, 1936). Robert Binkley was working on a study on the general use of microfilm by scholars for the Social Science Research Council. Overseas, Paul Otlet and Henri La Fontaine were arguing forcefully for the adoption of microfilm (Meckler, 1982; Cox, 1987).

It is unclear whether Seidell knew of these pioneering efforts or when he first became aware of microfilm. His first reference to microfilm appears in a talk on international cooperation in chemistry, published in *Science* in 1928. Seidell reports that his attention was drawn to microfilm by M. Jean Gérard of the Maison de la Chimie in Paris; based on the information he gives, this must have been in either 1926 or 1927. Gérard discussed with him some of the bibliographic problems present in chemistry. The problem, as he saw it, was that the chemistry literature was already so voluminous, that even the establishment of a comprehensive French abstract journal for current contributions in chemistry would have been difficult. The acceleration in the number of articles published each year

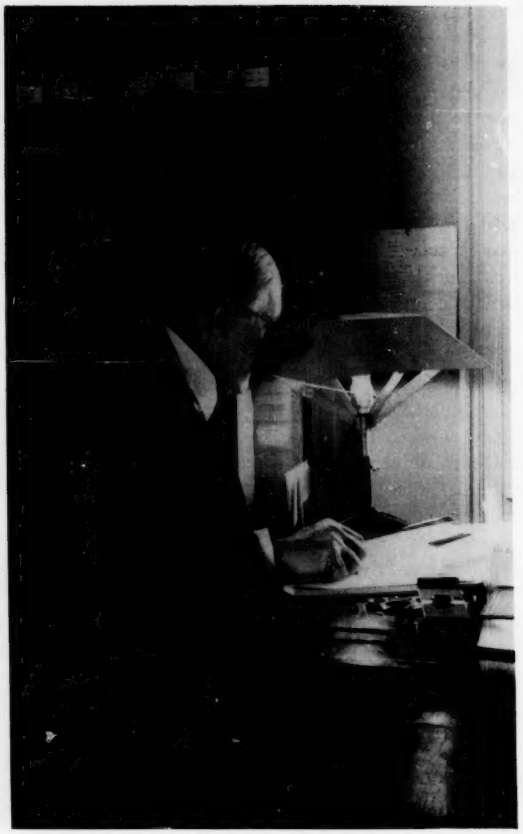

FIG. 2. Seidell looking through a microfilm viewer built into his lamp shade. Another of his viewers, consisting of a handle and magnifier, is on the table.

would only add to the burden. The solution, Gérard suggested, might be in microfilm (Seidell, 1925).

The experimental plan envisioned by Gérard and described by Seidell encompassed the reproduction of printed chemical articles onto microfilm. The film itself would be sent to the user, who would use projection equipment to read it. Abstracts of the articles that tried to give the substance of the paper would be replaced by the articles themselves; the only bibliographic control necessary would be cards that classified and described the scope of the papers. Interested scientists would then request the microfilm of articles in their fields of research.

The system, as conceived by Gérard and supported by Seidell, exhibits several features that constantly reoccur in Seidell's later work in microfilm. Most important is the emphasis on making information available to the research scientist. For Seidell, microfilm duplication could make known to interested scientists all research pertinent to their fields of investigation. Furthermore, it was efficient; as Seidell envisioned it, the microfilm system would obviate the need for chemical libraries to purchase periodicals, or even many chemical journals, both of which contained information of no concern to specialized chemists, and hence which represented a waste of scientific resources. While he recognized that such a system, by decreasing the size of journal print runs, might raise the price of individual journals, he could imagine that "multigraphing processes will be so highly developed by that time that the printing of journals devoted solely to research will not be necessary" (Seidell, 1928, p. 499).

By 1934 Seidell's interests had turned from the purely theoretical possibilities that microfilm presented as a communications tool to consideration of how best to establish a microfilm system. Thanks to the research of Robert Binkley, whose preliminary report appeared in 1931 (Binkley, 1936, p. iv) and the promotion of Watson Davis, microfilm no longer seemed to be a theoretical technology. By 1934 both men had convinced Seidell that cameras were available that were both efficient and low enough in price so as to make microfilming a cost-effective operation. Previously Seidell had to make his calculations of the cost of a microfilm service on the basis of estimates and guesswork, with the faith that cameras and readers that would meet the needs of a microfilming service would become available. Binkley's study confirmed Seidell's earlier faith that microfilm could be a cost-effective means of publishing (Seidell, 1935).

Thanks to Watson Davis's influence, Seidell also began to stress more and more the utility of microfilm as a means of dealing with the coming information overload in the chemical sciences. Davis proposed a solution to the information glut in a 1933 address to the Chemical Society of Washington, of which Seidell was an officer. Extending Seidell's 1928 suggestion that microfilming might make research journals obsolete, Davis proposed replacing all scientific publishing with a Scientific Information Institute that would maintain microfilm files of all original research. Abstracts of the research would be published in the appropriate journals; individuals could order microfilm copies of the full papers from the Scientific Information Institute (Seidell, 1934).[1]

Davis's call for the abolition of all scientific publishing and its replacement with a centralized microfilm distribution center both anticipates the "World Brain" idea of H. G. Wells and echoes some of Seidell's early writings.[2] Seidell recognized that Davis's plan, while perhaps desirable, was not practical. He proposed instead the establishment of a service similar in function but more limited in scope, one which would concentrate solely on chemical literature. The proposed institute, he suggested, could be called the "American Bureau of Chemical Documentation," or "A.B.C.D." for short. The advantages of such a sys-

[1]A step towards Davis's proposed institute was made when the Auxiliary Publication Service was established within the Science Service in 1936 (Schultz & Garwig, 1969; Farkas-Conn, 1984).

[2]Wells's "World Brain" idea was itself an extension of the Universal Bibliographic Repertoire first proposed by Paul Otlet and Henri La Fontaine. It is likely Seidell was influenced by their ideas, although there is no direct evidence establishing a connection. On Wells's "World Brain" idea and its history see (Goodman, 1987).

tem, according to Seidell, were many. Most of all it would lower the costs of "publishing" articles, freeing money for the abstract journals. In addition, it would eliminate the need for full editing of papers, making the complete research results available for interested scientists, including those in other countries. Finally Seidell recognized that at least the first beneficiaries would be chemists who did not have a good library available to them (Seidell, 1934).

The hypothetical system described by Seidell was based on a form of aperture card. The system, Seidell claimed,

> will be one in which 16-mm film is used, and from such strips of negatives of printed pages positives will be prepared and these mounted in windows on filing cards. Such cards need not be much larger than 10 × 5 centimeters and have sufficient space for typewriting the author's name, title of paper and its classification number in addition to the window in which will be fastened the film strip containing the photographs of some 20 printed pages. For longer papers two or more cards would be required. For reading these cards a small table projecting machine would be necessary, and this should permit of variable enlargement according to the desires of the reader (Seidell, 1934, p. 71).

Seidell may have felt he was being pragmatic in suggesting that Davis's grandiose vision of a central publishing house for all scientific research should at first be limited to the chemical literature. He failed to consider, however, the social and economic functions of scientific publishing beyond the mere distribution of scientific knowledge. For Seidell, the free exchange of scientific information would lead to improved science. Better science would of course lead to a better life for all in society. To Seidell (and to Davis) the contemporary system of scientific publishing stood as a roadblock and not as an aid to the free dissemination of scientific ideas; microfilm publishing was a means of circumventing that roadblock.

Bibliofilm Service

Almost as soon as Seidell's article suggesting a chemical publishing clearinghouse appeared, however, he modified his views. Instead of envisioning a national chemical or scientific institute that would publish and distribute on microfilm scientific papers, Seidell instead began to focus on the provision of microfilms through libraries.

Again, Watson Davis was intimately involved in the development. On November 5, 1934 Davis organized a luncheon for Seidell and 14 other individuals interested in microfilms at the Cosmos Club, a private club in Washington devoted to science, literature, and the arts. The purpose of the luncheon was to discuss the possibilities of a new microfilm camera designed by Lt. R. H. Draeger, a physician in the Navy Medical Department. Draeger, Seidell reported, "desired to provide himself with a conveniently transportable film library of scientific publications, for consultation and study while on shipboard or at distant naval posts" (Seidell, 1935, p. 174–175). As a consequence, Draeger began to experiment with microfilming cameras which, with the cooperation of the Navy Department, the Bureau of the Census, the Works Progress Administration, and the Department of Agriculture, and with the financial support of the Chemical Foundation, came to fruition in the Draeger camera (Draeger, 1937).

Before the development of the Draeger camera, there were two common arrangements for microfilming in libraries. The first involved modifying still cameras to accept a film magazine. Unfortunately these cameras, of which the Leica was the most well known, were usually limited in size and slow to operate. Alternatively, a library could try to adapt a Recordak camera, developed by Eastman Kodak for filming bank checks, to library work, but this too was most often unsuccessful.

The Draeger camera marked a true breakthrough in microfilm technology. Draeger's early cameras consisted of a table with lamps on either side and a pole in the rear from which was hung the camera. The camera itself consisted of notably large film reels and housing (containing 160 feet of film), the film winding mechanism, and the exposure chamber. It was estimated that with the camera between 1000 and 1500 pages could be photographed in an hour (Seidell, 1935).

The Draeger camera made feasible for the first time the efficient high-speed microfilming of library materials. At Seidell's suggestion, Claribel R. Barnett, the librarian of the U.S. Department of Agriculture Library (now the National Agricultural Library) and another participant in the Cosmos Club luncheon, arranged for Dr. Draeger to install late in 1934 his camera in her library. Seidell himself bought all the photographic materials needed to begin the service (Barnett, 1935). Thus began the first library photoduplication in lieu of loan service.

The "Biblio-Film Service," as the microfilming operation was originally known, quickly became the focus of Seidell's attention. During its first experimental year it was operated by the Department of Agriculture Library, then located in the agriculture building on the Mall in Washington, D.C. In 1936 the Bibliofilm Service was transferred to Watson Davis's Science Service, although it still did its filming in the Agriculture Library. In 1937 Davis organized the American Documentation Institute (ADI), now known as the American Society for Information Science. While some of the representatives of the scientific organizations invited to help form the ADI may have been vague about its broad general goals, its immediate purpose was to operate the Bibliofilm Service which Davis transferred to the fledgling organization (Schultz & Garwig, 1969; Farkas-Conn, 1984). In 1937 Bibliofilm operations were also extended into two other libraries, the Library of Congress and the Army Medical Library (now the National Library of Medicine) (Miles, 1982).

Seidell was present during the creation and early years of the Bibliofilm Service; he was also directly responsible for its demise. In January, 1940, Seidell was named director of the Bibliofilm Service on a volunteer, month-to-month basis. He was also elected to the ADI board of trustees and named secretary of the ADI at the same time.

Yet just seven months later, Seidell left Bibliofilm and the ADI, taking the Army Medical Library with him and in effect destroying the library network Bibliofilm had created.

Bibliofilm's own success was indirectly to blame. Colonel Harold Wellington Jones, Librarian of the Army Medical Library, had noted with pleasure in the library's 1938–1939 annual report the use made of the Bibliofilm service. Demand for the service convinced Jones that microfilming should be a normal part of library services, performed ideally by library staff. At the same time, the library objected to the performance of the service by an outsider contractor. "The Bibliofilm Service," Claudius Mayer, editor of *Index Medicus*, noted "looks out only for its own interest and growth. . . . It is more a commercial undertaking than a scientific institution." The best solution, he added, would be:

> the purchasing of microphotographic equipment and doing our own microfilm service. Then we would be sure that the back of our books will not break; that the sometimes valuable old bindings are not damaged; and that a good part of our service activities does not slip out of our hands (Mayer, 1940).

The library at that time could not afford to establish its own microfilm service, and so Seidell offered them the next best thing. He volunteered to operate as an individual the microfilm service in the Army Medical Library. To the disgust of Watson Davis, the Medicofilm Service of the Army Medical Library was begun by Seidell in September of 1940 (Farkas-Conn, 1984, pp. 23, 241–275; Medicofilm Service, 1940).

The Turn to Libraries

Seidell's involvement with the Bibliofilm Service and the Medicofilm Service opened up a new phase in his involvement with microfilm. Before, his interest had been those of a practicing scientist. His goal was to develop a system that would facilitate as much as possible the rapid dissemination of scientific information, even if it meant creating a huge information center or the destruction of scientific publishing as it was then known. With the advent of microfilming in libraries, Seidell's focus shifted to some of the problems of libraries. For the rest of his life, he struggled to make libraries conform to his youthful vision of scientific information freely disseminated to the research community.

The most obvious difference between Seidell's first proposals for a microfilming service and the practice as it developed in the Bibliofilm Service concerns the location of the microfilming operation. Seidell had initially thought that microfilming should be done within the context of a centralized information center, such as his proposed "American Bureau of Chemical Documentation." Even as late as 1937 Seidell still supported, as a first step towards the development of a universal information center, the creation of "filmothecs," microfilm libraries in which would be found complete collections of literature from single branches of science. Yet Seidell also recognized that even a "filmothec" would have difficulty in amassing its collections.

The solution, Seidell now suggested, rested not in creating new centralized collections, but rather through cooperation between libraries. While admitting that no one library received all the journals that must be consulted, he argued that "there has developed such a spirit of cooperation between American libraries that by choosing two or three of the most important, and setting up microfilm cameras in these, the few journals which would still be necessary could probably be secured by loan or by purchase" (Seidell, 1937, p. 242). Libraries, therefore, by cooperating with each other, could substitute for a universal information center.

Seidell's involvement with an active, as opposed to proposed, microfilming service also led him to reflect more upon the development of microfilm readers. Seidell had long recognized that the future of microfilm was in part dependent upon the development of practical microfilm readers, but had assumed that at the proper time projection readers could be inexpensively developed.

An actual microfilming service, however, needed practical microfilming readers. As Seidell noted, "without means of reading the greatly reduced-size print upon 35-mm filmstats, the service would be of no value" (Seidell, 1935, p. 417). Furthermore, to meet the needs of individual readers, a reader would need to be inexpensive. For a time he thought the microfilms could be read by bench scientists with their microscopes, but this turned out to be impractical (Brodman, 1980). For the Bibliofilm Service, therefore, he designed and had built a simple hand-held magnifier. It consisted of "a short cylinder, to one end of which is fixed a holder to receive the film, beyond which is a ground glass, and to other a lens capable of being focused to sharp definition of the image" (Seidell, 1935, p. 175). Built by the Spencer Lens Co., it was sold for $5.00 (Seidell, 1935, p. 417).

Seidell recognized the importance of keeping costs low in all facets of the operation of the microfilming system. Throughout his life, he sold readers and other equipment at his cost, or less. The microfilms from the Bibliofilm Service were only 10 cents for a 10-page article, with each additional 10 pages costing only 5 cents. And Seidell conceived of the time when free microfilm copies might still be less expensive than the lending of books, with its handling and mailing charges and the depreciation on the books (Seidell, 1935, p. 176).

Seidell's commitment to the inexpensive duplication of periodical literature made him a fervent supporter of microfilms; it also brought him into conflict with librarians and others over at least two issues, problems of copyright and charges for microfilm duplication.

Copyright

It is somewhat surprising that there is no discussion in Seidell's early writings of the possible complications arising from the duplication on microfilm of current copyrighted scientific literature. Watson Davis was well aware of the potential problem, and had helped secure in 1935 the "Gentleman's Agreement" with American publishers

governing library duplication of copyrighted material. Furthermore, the original Bibliofilm Service Circular stated that special arrangements had to be made for the copying of copyrighted material, implying that Seidell was aware of the potential problems associated with copyright (Bibliofilm Service, undated).

It was only in 1939 and 1940, however, that Seidell turned explicitly to the question of copyright in his writings. In two *Science* articles of those years Seidell (1939; 1940) addressed the question of copyright of scientific information, and came out squarely against any possible copyright protection for scientific publishers. His arguments hinge on two points. Firstly, scientific research is usually performed or published under the auspices of institutions, societies, and governments striving to advance learning. Any restrictions by them on publication would only serve to countermand their objective.

More fundamental to Seidell was the social utility afforded by the widespread dissemination of scientific knowledge. If scientific research is made well known, society as a whole would benefit. As he put it, scientific research was different from other forms of literary activity:

> Scientific research may in certain rare cases be pursued for personal gain, but its publication is practically always solely for the benefit of others. The real problem is to insure its widest possible dissemination to those best able to make use of it for the advancement of science (Seidell, 1939).

The social utility of scientific research outweighed, Seidell felt, the pecuniary concerns of the publishers. "Any restriction upon (its) most widespread use, which might be imposed by copyright, is not only contrary to the wishes and best interests of research workers but also indirectly to the public welfare" (Seidell, 1940, p. 345). Thus he concluded that "the question of copyright restriction and possible adverse effect of microfilm copying upon a relatively few journals should have little weight in appraising the tremendous service which microfilm copying in libraries can contribute to the advancement of learning" (Seidell, 1939, p. 220).

Seidell's ideas were tested by the library profession at a meeting of the Honorary Consultants to the Army Medical Library called in part to address the problem of the microfilm copying of copyrighted publications. At the meeting were librarians, representatives of the publishing industry, and Seidell. To Seidell's dismay, the librarians did not reject out of hand the position of the publishers, that profits from the publication of scientific research serve to spur further research and publishing. Instead, following the suggestion of Dr. Morris Fishbein, the library agreed to perform only the limited copying permitted under the 1935 "Gentleman's Agreement" while studying the problem further (Medinger, 1964; Association of the Honorary Consultants to the Army Medical Library, 1946). The matter was apparently never taken up again, leaving the problem of the photoduplication of copyrighted material to another generation of librarians.

Fee for Services

Seidell's primary interest in the efficient transmission of research data to interested scientists was at the root of his second major conflict with the librarians administering microfilm services. The battle concerned the cost of microfilming and the appropriate source of funds for those charges. The early experiments with library microphotographic duplication were not technically part of the libraries involved, and hence did not come from their budget. While the initial low charges for the Bibliofilm Service did not cover its operating expenses, at least at first the additional costs were covered by grant funds from the Chemical, Rockefeller, and Carnegie Foundations (Barnett, 1938; Seidell, 1939). The establishment of photoduplication as an accepted part of library operations raised a new issue, however: how was this service to be funded?

From a very early date, Seidell, in order to increase their utility as a means of disseminating scientific information, imagined that microfilms should be low in price. Beginning in 1941, Seidell began to argue in print for the abolition of fees for photoduplication. His argument hinged not on the social utility of the film (though that always underlay his thinking), but rather on microfilming as a natural extension of library service. First he pointed out that many other services are provided to patrons at no charge:

> Practically all great reference libraries are maintained largely at public expense or by endowments which have been collected for educational or cultural purposes. Their doors are open freely to all who are able to use their resources for the advancement of science or learning. A reader in one of these libraries is provided usually with a comfortable working place and he is waited upon by a corps of highly trained employees who place at his disposal as many books and as much reference material as may be desired. The reader takes away in his head or in the form of notes such portions of the published material as he needs. There is no charge whatever and in only rare cases is any attempt made to estimate the cost of this part of library operation. This and each of its other functions is looked upon as a public service contributing to the welfare of mankind (Seidell, 1941, p. 115).

The problem, as Seidell saw it, was that while libraries may not charge for their other services, some people felt that they should charge for microfilm copies. There was, he argued, "no more justification for charging for limited microfilm copying than there is for charging for any of the other services by which the resources of libraries are placed at the disposal of those capable of using them for the advancement of learning" (Seidell, 1944, p. 418).

As a consequence of Seidell's commitment to the free distribution of scientific ideas, costs in his microfilm services were kept intentionally low, made possible in part due to their support from his personal fortune. The Bibliofilm Service, as has been noted, charged only 10¢ for a ten page article. The Medicofilm Service charged only 30¢, quickly dropped to 25¢, for up to a 25-page article. While these charges were already quite low, Seidell's greatest

victory came in 1943 when the Army Medical Library adopted a policy of distributing microfilms in lieu of loans to libraries for free. In making the announcement of the new policy, Seidell noted that:

> This marks the beginning of the recognition of microfilm copying as a service which public reference libraries might render to those at a distance on the same gratuitous basis that long custom has authorized them to serve those who are unable to come in person to the library. The gradual extension of microfilm copying in lieu of loans of scientific journals may perhaps contribute as much to the advancement of science as any other innovation of library practice of recent times (Editorial, 1943).

Given Seidell's firm belief in what came to be known as the "Seidell Doctrine," that microfilms should be distributed to research scientists for free, the Army Medical Library's decision in 1947 to charge once again for microfilm copies was particularly painful. The end of the war removed the seeming necessity for free distribution of microfilms, and the director of the library, Colonel Leo Lloyd Gardner, proposed to charge 50 cents for each microfilm made. Seidell protested vigorously. Once again he based his case on the two arguments of public utility and library services. The practice of making microfilm copies for free, he claimed, was intended only to help those serving medical science and seeking to improve the living standards of a war-torn world. Furthermore, he argued that it was evident that:

> microfilm copying is simply a means of permitting a library to render to those at a distance a service almost, if not quite, equivalent to that which it renders without any charge to those who come to it in person. To require a payment in one case and not in the other is a discrimination of which an institution of the national and public welfare character of the Army Medical Library should not be guilty (Seidell, 1947).

Seidell's attack on the Army Medical Library's new policy of charging for microfilms met with some success. The policy was modified in 1948 to permit the free *loan* of microfilms to libraries, but scientists wishing to keep a microfilm copy would need to purchase the film for 50¢. The "Seidell Doctrine" of free interlibrary loan of material in lieu of the original remained the theoretical foundation for the library's interlibrary loan policy for the next 35 years until 1983, when the National Library of Medicine (the successor to the Army Medical Library) quietly abandoned the policy (Rogers, 1958; Kurth, 1962; Cassidy, 1967; NLM announces, 1983).

For the rest of his life Seidell battled to see the example of the Army Medical Library extended to other libraries. In his writings he continued to maintain that photoduplication was a natural extension of library service. To those who argued that free photoduplication would increase the use of their collections, Seidell responded that this was something to be welcomed, not feared. As increase in use, he argued, would only be evidence that "the library is fulfilling to a greater degree the purposes for which it exists." The library may, he added, be able to contribute more to a scientific field by placing resources at the disposal of workers at a distance rather than reserving them for the relatively few numbers of researchers in the immediate vicinity. In one of the most naive assessments of the motives of library resource allocators ever published, Seidell speculated that "the additional funds to support such a meritorious extension of library activity should not be difficult to obtain" (Seidell, 1941, p. 167).

Unfortunately for Seidell, his arguments fell on mostly deaf ears in the library world. As one Honorary Consultant to the Army Medical Library noted, "Seidell is an idealist with generous impulses but I don't think that he views things very realistically" Fulton, 1947). Even within the documentation community his ideas met with opposition. At the 1951 meeting of the American Documentation Institute, for example, Seidell proposed a resolution recognizing microfilm copying as a legitimate extension of the service that libraries render, rather than as a special enterprise attached to the library. In a vintage statement of Seidell's ideals, the resolution went on to state that "[n]o distinction should be made in the service rendered to persons at a distance by microfilm copying and that rendered to those who are able to come into the library to consult its collections" (American Documentation Institute, 1951). Yet even in a group friendly to microfilms, Seidell's idealistic approach to the dissemination of information was once again defeated.

Conclusions

Seidell's ideas met with opposition throughout his life. His earlier advocacy of centralized scientific publishing led at least one critic to suggest he was a socialist.[3] Paradoxically, as advances in first microfilm and later xerographic copying made the free distribution of photographic copying more practical and feasible in terms of cost, fewer and fewer libraries adopted his later doctrines. Seidell continued to commit his time and his personal fortune to the extension of library services to users at a distance through the free distribution of microfilm copies through the 1950s, even at one point offering to give microfilm cameras to libraries for free if they would agree to distribute copies without charge (Science, 1957), but his efforts met with decreasing success. Only the National Library of Medicine remained wedded to his doctrine. Yet Seidell's faith in the importance of the rapid dissemination of information to research scientists never dimmed, and he welcomed the arrival of the photocopy machine, the technology that has made some of his dreams possible.

Of what importance are Seidell's ideas, rejected during his own lifetime, to us who are faced with a whole new set of technologies for the rapid dissemination of scientific information? There are at least two good lessons to be learned from Seidell's story. The first concerns the justifications

[3]"Dr. Seidell, now with the U.S. Public Health Service, and for 40 years on the payroll of the government, describes the scheme one would expect of Totalitarian State or the U.S.S.R." (Sutton, 1940).

for the development of a new technology. Seidell's more grandiose dreams — the creation of a universal information center of microfilm, the restructuring of scientific publication into a more "efficient" arrangement, and the international exchange of all scientific information — may have been ignored, but his desire to implement those dreams led to the creation of modern library photoduplication, an activity with long-lasting consequences. We should never forget that the products of a worthwhile activity may not always take the form their creators intended, but be no less useful for that reason.

More importantly, Seidell can serve as a reminder to all librarians and information specialists that they cannot afford to forget their users. Seidell's goal, like most librarians, was to make scientific information as widely available as possible. To achieve that end Seidell was willing to rethink all existing library technologies, services, and procedures. His ideas should give everyone connected with information pause to consider whether or not their products are truly of use to the audience they hope to serve.

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